07-22-05

HEWLETT-PACKARD COMPANY
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PATENT APPLICATION AF

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IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Bradford A. Ritter et al. **Confirmation No.:** 8313

Application No.: 09/921,681 **Examiner:** K. T. Nguyen

Filing Date: Auagust 3, 2001 **Group Art Unit:** 2671

Title: SYSTEM AND METHOD FOR RENDERING DIGITAL IMAGES HAVING SURFACE REFLECTANCE PROPERTIES

Mail Stop Appeal Brief-Patents
Commissioner For Patents
PO Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Sir:

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on July 13, 2005.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) $500.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

( ) (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d) for the total number of months checked below:

( )	one month	$120.00
( )	two months	$450.00
( )	three months	$1020.00
( )	four months	$1590.00

( ) The extension fee has already been filled in this application.

(X) (b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account **08-2025** the sum of **$500.00**. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.

(X) I hereby certify that this correspondence is being deposited with the United States Postal Service as Express Mail, Label No. EV 482711456US addressed to: Commissioner for Patents, M/S Appeal Brief - Alexandria, VA 22313-1450
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Respectfully submitted,

Bradford A. Ritter et al.

By

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HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, Colorado 80527-2400

Docket No.: 10015864-1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Bradford A. Ritter et al.

Application No.: 09/921,681 | Confirmation No.: 8313

Filed: August 3, 2001 | Art Unit: 2671

For: SYSTEM AND METHOD FOR RENDERING DIGITAL IMAGES HAVING SURFACE REFLECTANCE PROPERTIES | Examiner: K. T. Nguyen

APPEAL BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

As required under § 41.37(a), this brief is filed within two months of the Notice of Appeal filed in this case on July 13, 2005, and is in furtherance of said Notice of Appeal.

The fees required under § 41.20(b)(2) are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief contains items under the following headings as required by 37 C.F.R. § 41.37 and M.P.E.P. § 1206:

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I. REAL PARTY IN INTEREST

The real party in interest for this appeal is:

Hewlett-Packard Development Company, L.P., a Texas Limited Partnership having its principal place of business in Houston, Texas.

II. RELATED APPEALS, INTERFERENCES, AND JUDICIAL PROCEEDINGS

There are no other appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

A. Total Number of Claims in Application

There are 53 claims pending in application.

B. Current Status of Claims

1. Claims canceled: 1
2. Claims withdrawn from consideration but not canceled: None
3. Claims pending: 1-25 and 27-54
4. Claims allowed: 1-18 and 52
5. Claims rejected: 19-51, 53 and 54

C. Claims On Appeal

The claims on appeal are claims 19-25, 27-51, 53 and 54

IV. STATUS OF AMENDMENTS

The present application for patent was filed August 3, 2001. A first Office Action was mailed March 19, 2004, and Applicant responded with an Amendment dated June 3, 2004. A second non-final Office Action was then mailed August 17, 2004, and Applicant responded with an Amendment dated November 17, 2004. A final Office Action was mailed April 20, 2005. Applicant did not file an Amendment after such final Office Action, but instead filed the notice of appeal which this brief supports. Thus, the claims pending in this appeal (attached in Appendix A of this brief) are as rejected in the final Office Action of April 20, 2005.

V. SUMMARY OF CLAIMED SUBJECT MATTER

According to one embodiment of the present invention, a system for rendering a digital image utilizing a texture map is provided. The system comprises a texture map data structure including a function for representing a texture map of a plurality of texels. *See e.g.*, page 13, line 3 – page 14, line 23 of the present application. The function evaluates at least two independent variables for defining an illumination vector and at least two independent variables for defining a view vector. *See e.g.*, page 19, line 1 – page 21, line 4 and page 26, lines 4-23 of the present application.

According to another embodiment of the present invention, a system for rendering a digital image utilizing a texture map comprises a texture map data structure including a function for representing a texture map of a plurality of texels. *See e.g.*, page 13, line 3 – page 14, line 23 of the present application. The function evaluates at least two independent variables for defining a half-angle vector and at least two independent variables for defining a difference vector. *See e.g.*, page 21, line 5 – page 22, line 24 and page 26, lines 4-23 of the present application.

According to another embodiment of the present invention, a method comprises using a texture map that includes a function for use in rendering a digital image having surface reflectance properties. *See e.g.* page 13, line 22 – page 14, line 7 of the present application. The function evaluates more than two variables directed to surface reflectance properties. *See e.g.*, page 19, line 1 – page 22, line 24 and page 26, lines 4-23 of the present application. In one embodiment, the function evaluates at least two independent variables for defining an illumination vector and at least two independent variables for defining a view vector. *See*

e.g., page 19, line 1 – page 21, line 4 and page 26, lines 4-23 of the present application. In another embodiment, the function evaluates at least two independent variables for defining a half-angle vector and at least two independent variables for defining a difference vector. *See e.g.*, page 21, line 5 – page 22, line 24 and page 26, lines 4-23 of the present application.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 27 and 29-44 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,583,790 issued to Wolters (hereinafter "*Wolters*");

Claims 19-25, 28, and 45-48 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wolters* in view of U.S. Patent No. 6,765,573 issued to Kouadio (hereinafter "*Kouadio*");

Claims 49-51 and 53 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wolters*; and

Claim 54 is rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wolters* in view of U.S. Patent No. 5,537,494 issued to Toh (hereinafter "*Toh*").

VII. ARGUMENT

I. Rejections Under 35 U.S.C. § 102(e)

Claims 27 and 29-44 are rejected under 35 U.S.C. § 102(e) as being anticipated by *Wolters*. To anticipate a claim under 35 U.S.C. § 102, a single reference must teach every element of the claim, *see* M.P.E.P. § 2131. Appellant respectfully submits that *Wolters* fails to teach each and every element of claims 27 and 29-44, as discussed below.

<u>Independent Claim 27</u>

Independent claim 27 recites "a texture map data structure including a function for representing a texture map of a plurality of texels, <u>said function evaluating at least two independent variables for defining an illumination vector and at least two independent variables for defining a view vector</u>" (emphasis added). *Wolters* fails to explicitly teach a texture map data structure that includes a function that evaluates at least two independent variables for defining an illumination vector <u>and</u> at least two independent variables for defining a view vector.

The Final Office Action cites to col. 5, lines 12-20 of *Wolters* as teaching a texture map data structure that includes a function that evaluates at least two independent variables for defining an illumination vector and at least two independent variables for defining a view vector. Col. 5, lines 12-22 of *Wolters* provides:

> The eye point vector V represents a view direction from a pixel P_k of the polygon 22 to an eye point 26. The light source vector L represents a light source direction from-the pixel P_k to a light source 28. The half-angle vector H represents the vector that is halfway between the eye point vector V and the light source vector L. Also shown is a (V_u, V_v) vector which is the eye point vector V projected down into the plane of the polygon 22. Likewise, a (L_u, L_v) vector is the projection of the light source vector L and a (H_u, H_v) vector is the projection of the half-angle vector H.

The above portion of *Wolters* merely defines the various vectors in relation to the exemplary polygon shown in FIGURE 2 thereof, and does not teach evaluating any one or more of such vectors by a function. That is, this portion of *Wolters* merely establishes terminology by describing in relation to FIGURE 2 what is meant by an eye point vector V, light source vector L, and half-angle vector H. Nothing in the above-quoted portion of *Wolters* teaches how any of such vectors may be used by a function for representing a texture map of a plurality of texels. As described further below, the portions of *Wolters* that describes a function of a parametric texture map data structure explicitly teach a function that evaluates either two independent variables (i.e., D_u,D_v) for defining an illumination vector <u>or</u> two independent variables (i.e., D_u,D_v) for defining a view vector. In no instance, does *Wolters* explicitly teach such a function that evaluates both two independent variables for defining an illumination vector <u>and</u> two independent variables for defining a view vector, as recited by claim 27.

For instance, *Wolters* teaches, at column 3, line 60 – column 4, line 5, a parametric texture map data structure that includes the function $C_i=A1D_u^2+A2D_v^2+A3D_uD_v+A4D_u+A5D_v+A6$, where D_u and D_v are the 2D components of a user-defined vector. For example, D_u and D_v may, in certain implementations, be the 2D components of an eye point vector. Col. 4, lines 1-2. As another example, D_u and D_v may, in certain implementations, be the 2D components of a half-angle vector. Col. 4, lines 2-5. In other implementations, the D_u and D_v variables may be the 2D components of some other user-defined vector. Accordingly, under this function, either two independent variables (i.e., D_u,D_v) for defining an illumination vector <u>or</u> two independent variables (i.e., D_u,D_v) for

defining a view vector may be included, but not both two independent variables for defining an illumination vector and two independent variables for defining a view vector, as recited by claim 27.

As described in the present application at page 18, lines 1-20:

> A PTM function may comprise four degrees of freedom (or four independent variables). For example, two independent variables (*Lu, Lv*) may represent a 2D parameterization of a light position (i.e., represent the light direction), as discussed above, and two independent variables (*s,t*) may be included within the PTM function as texture coordinates that allow the properties of a 3D object to vary across its surface. That is, a texture may have different characteristics depending on the surface position.... Accordingly, a traditional PTM function having four degrees of freedom and six coefficients may be represented as follows:
> $PTM(s,t,L_u,L_v) = A(s,t)L_u^2 + B(s,t)L_v^2 + C(s,t)L_uL_v + D(s,t)L_u + E(s,t)L_v + F(s,t)$.
> As with the variables u and v described above, L_u and L_v represent scalar quantities associated with orthogonal components of a vector. For example, *Lu* and *Lv* may represent the intensity of light from two different directions where the texel is rendered on the three-dimensional object, as described above. And, s and t represent texture coordinates that identify a position on the texture.

Thus, a traditional PTM function, such as the exemplary PTM function discussed in *Wolters*, includes two variables (D_u and D_v) that are the 2D components of a user-defined vector. Typically, variables corresponding to surface position of each pixel a pixel are included in the PTM function for indexing such PTM function. Thus, the two variables (D_u and D_v) are evaluated by the function based on the corresponding positional variables (s,t) of a pixel to compute the value of such pixel. Again, *Wolters* does not expressly teach a texture map data structure that includes a function that evaluates at least two independent variables for defining an illumination vector and at least two independent variables for defining a view vector.

Accordingly, independent claim 27 is not anticipated under 35 U.S.C. § 102 by *Wolters*. Thus, Appellant requests that the rejection of claim 27 be overturned.

Dependent Claims 29-31

Each of dependent claims 29-31 depend either directly or indirectly from independent claim 27, and thus inherit all limitations of claim 27. It is respectfully submitted that

dependent claims 29-31 are allowable at least because of their dependency from claim 27 for the reasons discussed above.

Independent Claim 32

Independent claim 32 recites "a texture map data structure including a function for representing a texture map of a plurality of texels, said function evaluating at least two independent variables for defining a half-angle vector and at least two independent variables for defining a difference vector" (emphasis added). *Wolters* fails to explicitly teach a texture map data structure that includes a function that evaluates at least two independent variables for defining a half-angle vector and at least two independent variables for defining a difference vector. As described above with independent claim 27, *Wolters* mentions various vectors, but fails to teach a function evaluating a combination of the vectors in the manner recited by claim 32. For instance, *Wolters* teaches, at column 3, line 60 – column 4, line 5, a parametric texture map data structure that includes the function $C_i=A1D_u^2+A2D_v^2+A3D_uD_v+A4D_u+A5D_v+A6$, where D_u and D_v are the 2D components of a user-defined vector. For example, D_u and D_v may, in certain implementations, be the 2D components of an eye point vector. Col. 4, lines 1-2. As another example, D_u and D_v may, in certain implementations, be the 2D components of a half-angle vector. Col. 4, lines 2-5. In other implementations, the D_u and D_v variables may be the 2D components of some other user-defined vector.

Accordingly, under this function, either two independent variables (i.e., D_u, D_v) for defining a half-angle vector or two independent variables (i.e., D_u, D_v) for defining a difference vector may be included, but not both two independent variables for defining a half-angle vector and two independent variables for defining a difference vector, as recited by claim 32. Typically, a PTM function, such as that of *Wolters* provides only two independent variables corresponding to the 2D components of a user-defined vector (e.g., either a half-angle vector or a difference vector), which are evaluated based on two positional variables (e.g., s,t).

Accordingly, independent claim 32 is not anticipated under 35 U.S.C. § 102 by *Wolters*. Therefore, Appellant requests that this rejection of claim 32 be overturned.

Dependent Claims 33-35

Each of dependent claims 33-35 depend either directly or indirectly from independent claim 32, and thus inherit all limitations of claim 32. It is respectfully submitted that dependent claims 33-35 are allowable at least because of their dependency from claim 32 for the reasons discussed above.

Independent Claims 36, 39, and 42

Independent claim 36 recites "using a texture map that includes a function for use in rendering a digital image having surface reflectance properties, wherein said function evaluates more than two variables directed to surface reflectance properties" (emphasis added).

Independent claim 39 recites "a texture map that includes a function for use in rendering a digital image, wherein said function evaluates more than two variables relating to surface reflectance properties of said digital image" (emphasis added).

Independent claim 42 recites "receiving more than two independent variables relating to surface reflectance properties of a digital image to be rendered" (emphasis added).

Thus, each of these claims recite more than two independent variables relating to surface reflectance properties. As discussed above, *Wolters* does not expressly teach a parametric texture mapping ("PTM") function that includes more than two independent variables relating to surface reflectance properties. Rather, the PTM function of *Wolters* may include two independent variables relating to surface reflectance properties (e.g., D_u and D_v, which may be the 2D components of an eye point vector, or a half-angle vector, or some other user-defined vector). Those D_u and D_v variables are typically indexed in a PTM function based on positional variables (s,t). The PTM function of *Wolters* does not expressly provide for more than two independent variables that relate to surface reflectance properties.

Accordingly, independent claims 36, 39, and 42 are not anticipated under 35 U.S.C. § 102 by *Wolters*. Therefore, Appellant requests that the rejections of claims 36, 39, and 42 be overturned.

Dependent Claim 37

Dependent claim 37 depends from independent claim 36 and thus inherits the elements of claim 36. Accordingly, claim 37 is allowable at least for the reasons discussed above for claim 36. Additionally, claim 37 recites "wherein said function evaluates at least two independent variables for defining an illumination vector and at least two independent variables for defining a view vector." As discussed above with independent claim 27, *Wolters* fails to teach such a function that evaluates at least two independent variables for defining an illumination vector <u>and</u> at least two independent variables for defining a view vector. Accordingly, claim 37 is not anticipated under 35 U.S.C. § 102 by *Wolters*. Therefore, Appellant requests that the rejection of claim 37 be overturned.

Dependent Claim 38

Dependent claim 38 depends from independent claim 36 and thus inherits the elements of claim 36. Accordingly, claim 38 is allowable at least for the reasons discussed above for claim 36. Additionally, claim 38 recites "wherein said function evaluates at least two independent variables for defining a half-angle vector and at least two independent variables for defining a difference vector." As discussed above with independent claim 32, *Wolters* fails to teach such a function that evaluates a at least two independent variables for defining a half-angle vector <u>and</u> at least two independent variables for defining a difference vector. Accordingly, claim 38 is not anticipated under 35 U.S.C. § 102 by *Wolters*. Therefore, Appellant requests that the rejection of claim 38 be overturned.

Dependent Claim 40

Dependent claim 40 depends from independent claim 39 and thus inherits the elements of claim 39. Accordingly, claim 40 is allowable at least for the reasons discussed above for claim 39. Additionally, claim 40 recites "wherein said function evaluates at least two independent variables for defining an illumination vector and at least two independent variables for defining a view vector." As discussed above with independent claim 27, *Wolters* fails to teach such a function that evaluates at least two independent variables for defining an illumination vector <u>and</u> at least two independent variables for defining a view vector. Accordingly, claim 40 is not anticipated under 35 U.S.C. § 102 by *Wolters*. Therefore, Appellant requests that the rejection of claim 40 be overturned.

Dependent Claim 41

Dependent claim 41 depends from independent claim 39 and thus inherits the elements of claim 39. Accordingly, claim 41 is allowable at least for the reasons discussed above for claim 39. Additionally, claim 41 recites "wherein said function evaluates at least two independent variables for defining a half-angle vector and at least two independent variables for defining a difference vector." As discussed above with independent claim 32, *Wolters* fails to teach such a function that evaluates a at least two independent variables for defining a half-angle vector and at least two independent variables for defining a difference vector. Accordingly, claim 41 is not anticipated under 35 U.S.C. § 102 by *Wolters*. Therefore, Appellant requests that the rejection of claim 41 be overturned.

Dependent Claim 43

Dependent claim 43 depends from independent claim 42 and thus inherits the elements of claim 42. Accordingly, claim 43 is allowable at least for the reasons discussed above for claim 42. Additionally, claim 43 recites "said function evaluating at least two independent variables for defining an illumination vector and at least two independent variables for defining a view vector." As discussed above with independent claim 27, *Wolters* fails to teach such a function that evaluates at least two independent variables for defining an illumination vector and at least two independent variables for defining a view vector. Accordingly, claim 43 is not anticipated under 35 U.S.C. § 102 by *Wolters*. Therefore, Appellant requests that the rejection of claim 43 be overturned.

Dependent Claim 44

Dependent claim 44 depends from independent claim 42 and thus inherits the elements of claim 42. Accordingly, claim 44 is allowable at least for the reasons discussed above for claim 42. Additionally, claim 44 recites "said function evaluating at least two independent variables for defining a half-angle vector and at least two independent variables for defining a difference vector." As discussed above with independent claim 32, *Wolters* fails to teach such a function that evaluates a at least two independent variables for defining a half-angle vector and at least two independent variables for defining a difference vector.

Accordingly, claim 44 is not anticipated under 35 U.S.C. § 102 by *Wolters*. Therefore, Appellant requests that the rejection of claim 44 be overturned.

II. Rejections Under 35 U.S.C. § 103(a)

Claims 19-25, 28, and 45-48 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wolters* in view of *Kouadio*. Claims 49-51 and 53 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wolters*. Claim 54 is rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wolters* in view of *Toh*.

Each of the above § 103(a) rejections relies on *Wolters*. Applicant respectfully asserts that *Wolters* is not a valid prior art reference for use in a § 103(a) rejection, and therefore these rejections should be overturned. As amended by the American Inventor's Protection Act of 1999 (the Act), signed on November 29, 1999, section 103(c) now states:

> (c) Subject matter developed by another person, which qualifies as prior art only under one or more of sub-sections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Section 4807 of the Act further provides that this new provision applies to any application filed on or after the date of enactment, November 29, 1999. The present application was filed August 3, 2001.

Wolters and this application were at the time the invention was made, owned by or subject to an obligation of assignment to the same entity, namely Hewlett-Packard Development Company LP. *Wolters* was filed before, but did not issue until after the current application's filing date. Therefore, the disclosure of *Wolters* is available only as 35 U.S.C. § 102(e)-type prior art. In that regard, 35 U.S.C. § 103(c) now provides that *Wolters* "shall not preclude patentability" of the claimed invention.

Accordingly, the rejections of claims 19-25, 28, 45-51, and 53-54 are improper and should therefore be overturned.

VIII. CLAIMS

A copy of the claims involved in the present appeal is attached hereto as Appendix A. As indicated above, the claims in Appendix A are as rejected in the final Office Action mailed April 20, 2005.

IX. EVIDENCE

As noted in Appendix B, no evidence pursuant to §§ 1.130, 1.131, or 1.132 or entered by or relied upon by the examiner is being submitted.

X. RELATED PROCEEDINGS

As noted in Appendix C, no related proceedings are referenced in II. above, and thus no copies of decisions in related proceedings are provided.

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Date of Deposit: July 21, 2005

Typed Name: Gail L. Miller

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Respectfully submitted,

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APPENDIX A

Claims Involved in the Appeal of Application Serial No. 09/921,681

1-18 (Allowed)

19. A computer graphics system including a graphics processor and display, the system comprising:

a parametric texture map executable by said graphics processor, wherein said parametric texture map models a surface reflectance function defining surface reflectance properties for a surface structure, and wherein said surface reflectance function comprises a Bidirectional Reflectance Distribution Function (BRDF).

20. The system of claim 19, wherein said parametric texture map comprises four independent variables.

21. The system of claim 20, wherein said parametric texture map comprises at least two independent variables for defining a light direction vector for said surface reflectance function.

22. The system of claim 19 wherein said parametric texture map comprises at least two independent variables for defining a view direction vector for said surface reflectance function.

23. The system of claim 19 wherein said parametric texture map comprises at least two independent variables for defining a half-angle vector for said surface reflectance function.

24. The system of claim 19 wherein said parametric texture map comprises at least two independent variables for defining a difference vector for said surface reflectance function.

25. The system of claim 19 wherein said parametric texture map is executable by said graphics processor to render said surface structure having surface reflectance properties defined by said surface reflectance function in substantially real-time.

26. (Canceled)

27. A system for rendering a digital image utilizing a texture map, said system comprising:

a texture map data structure including a function for representing a texture map of a plurality of texels, said function evaluating at least two independent variables for defining an illumination vector and at least two independent variables for defining a view vector.

28. The system of claim 27 wherein said texture map data structure models a surface reflectance function for a surface structure.

29. The system of claim 27 wherein said texture map data structure further comprises a plurality of coefficients for each texel of said texture map, said plurality of coefficients defining lighting characteristics for varying views of each respective texel.

30. The system of claim 27 further comprising:

a rendering algorithm, said rendering algorithm being operable to calculate texel display value using said texture map data structure.

31. (The system of claim 30 wherein said rendering algorithm is operable to render a 3D object having surface reflectance properties as defined by said texture map data structure.

32. A system for rendering a digital image utilizing a texture map, said system comprising:

a texture map data structure including a function for representing a texture map of a plurality of texels, said function evaluating at least two independent variables for defining a half-angle vector and at least two independent variables for defining a difference vector.

33. The system of claim 32 wherein said texture map data structure models a surface reflectance function for a surface structure.

34. The system of claim 32 further comprising:

a rendering algorithm, said rendering algorithm being operable to calculate texel display value using said texture map data structure.

35. The system of claim 34 wherein said rendering algorithm is operable to render a 3D object having surface reflectance properties as defined by said texture map data structure.

36. A method comprising:

using a texture map that includes a function for use in rendering a digital image having surface reflectance properties, wherein said function evaluates more than two variables directed to surface reflectance properties.

37. The method of claim 36 wherein said function evaluates at least two independent variables for defining an illumination vector and at least two independent variables for defining a view vector.

38. The method of claim 36 wherein said function evaluates at least two independent variables for defining a half-angle vector and at least two independent variables for defining a difference vector.

39. A system comprising:

a texture map that includes a function for use in rendering a digital image, wherein said function evaluates more than two variables relating to surface reflectance properties of said digital image.

40. The system of claim 39 wherein said function evaluates at least two independent variables for defining an illumination vector and at least two independent variables for defining a view vector.

41. The system of claim 39 wherein said function evaluates at least two independent variables for defining a half-angle vector and at least two independent variables for defining a difference vector.

42. A method comprising:

receiving more than two independent variables relating to surface reflectance properties of a digital image to be rendered; and

using a function of a texture map for processing the received variables to render the digital image having surface reflectance properties in accordance with the received variables.

43. The method of claim 42 wherein said using said function comprises:

said function evaluating at least two independent variables for defining an illumination vector and at least two independent variables for defining a view vector.

44. The method of claim 42 wherein said using said function comprises:

said function evaluating at least two independent variables for defining a half-angle vector and at least two independent variables for defining a difference vector.

45. A system comprising:

a texture map that includes a Bidirectional Reflectance Distribution Function (BRDF) for use in rendering a digital image, wherein said BRDF includes more than two variables relating to surface reflectance properties of said digital image.

46. The system of claim 45 wherein said more than two variables are selected from the group consisting of:

variables for defining an illumination vector, variables for defining a view vector, variables for defining a half-angle vector, and variables for defining a difference vector.

47. The system of claim 45 wherein said more than two variables includes at least two independent variables for defining an illumination vector and at least two independent variables for defining a view vector.

48. The system of claim 45 wherein said more than two variables includes at least two independent variables for defining a half-angle vector and at least two independent variables for defining a difference vector.

49. Computer-executable software code stored to a computer-readable medium, said computer-executable software code comprising:

code for receiving at least four independent surface reflectance property variables; and

code for using a function included in a texture map for rendering a digital image, wherein said function evaluates the received at least four independent surface reflectance property variables to render said digital image having proper surface reflectance properties.

50. The method of claim 49 wherein said at least four independent surface reflectance property variables comprise:

at least two independent variables for defining an illumination vector; and

at least two independent variables for defining a view vector.

51. The method of claim 49 wherein said at least four independent surface reflectance property variables comprise:

at least two independent variables for defining a half-angle vector; and

at least two independent variables for defining a difference vector.

52. (Allowed)

53. A method for rendering a digital image having surface reflectance properties, said method comprising:

creating a parametric texture map that comprises parameters for an equation that defines a surface structure in a manner in which the appearance of the surface structure includes surface reflectance properties, wherein said equation models a Bidirectional Reflectance Distribution Function (BRDF); and

rendering a digital image using said parametric texture map.

54. A method for creating a parametric texture map for modeling surface reflectance properties for use in rendering a digital image having said surface reflectance properties, said method comprising:

for each texel of a texture, sampling surface reflectance data and determining at least one coefficient of said parametric texture map based at least in part on the sampled surface reflectance data, wherein said step of determining further comprises performing a least squares fit algorithm to the sampled surface reflectance data.

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APPENDIX B

Evidence Presented in the Appeal of Application Serial No. 09/921,681

None

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APPENDIX C

Related Proceedings in the Appeal of Application Serial No. 09/921,681

None